quate for defects reaching from one angle of the jaw to the opposite angle. Reattaching the teres muscles and active physical therapy postoperatively will minimize donor-site morbidity. One or two appropriately placed ostectomies allow contouring of the bone to the necessary curvature for anterior arch replacement. Small compression plates secure the bone graft in position.

Standard microvascular techniques of end-to-end or end-to-side anastomosis are used to reestablish perfusion to the flap. Although a microvascular flap transfer adds several hours to an already lengthy procedure, using a two-team approach allows the flap to be simultaneously harvested while primary tumor removal and neck dissection are done.

The two published clinical series using the scapular osteocutaneous flap for mandibular reconstruction report no flap failures and a 90% bony union rate in a total of 31 patients. Our own early clinical experience certainly supports this. The additional time and cost involved in doing a one-stage, vascularized reconstruction are justified when subsequent hospital admissions and surgical procedures can be obviated, delays in initiating planned combined radiotherapy can be avoided, and patients can have immediate restoration of appearance and function.

MICHAEL G. GLENN, MD
Seattle

REFERENCES

Baker SR, Sullivan MJ: Osteocutaneous free scapular flap for a one-stage mandibular reconstruction. Arch Otolaryngol Head Neck Surg 1988; 114:267-277

Swartz WM, Banis JC, Newton ED, et al: The osteocutaneous scapular flap for mandibular and maxillary reconstruction. Plast Reconstr Surg 1986; 77:530-545

Advances in Chemoprophylaxis for Head and Neck Surgical Wound Infections

PATIENTS UNDERGOING PROCEDURES of the head and neck are susceptible to wound infection because there is frequent contamination from bacterial flora of the upper aerodigestive tract. Studies have conclusively shown that using antibiotic prophylaxis substantially reduces this risk. More recent studies have provided further refinements in the guidelines for antibiotic prophylaxis in head and neck operations. Prolonged antibiotic administration, a commonly used practice, has no added benefit compared with short-term prophylaxis. It has now been clearly shown that the rate of wound infection for procedures that do not involve exposure of the aerodigestive tract—that is, clean wounds—is sufficiently low not to warrant routine antibiotic prophylaxis. Both of these observations represent substantial cost reductions. Risk factors that previously were thought to contribute to the development of wound infection, such as preoperative radiotherapy and chemotherapy, do not appear to be significant. Factors that carry the highest risk include the stage of the disease and the complexity of the operative procedure.

The choice of antibiotic that provides the best protection against wound infection remains controversial. Some studies support the use of broad-spectrum agents effective against most gram-positive aerobes including staphylococci and many gram-negative organisms. Other studies support the use of third-generation cephalosporins that are most effective against anaerobic organisms. These newer third-generation cephalosporins, however, are less effective against gram-positive and gram-negative aerobic organisms. A recent study indicated the etiologic importance of anaerobes in the development of head and neck wound infections. The combination of metronidazole, highly specific for anaerobes, and cefazolin was associated with a significantly lower infection rate when compared with prophylaxis with cefazolin alone (9.5% versus 18.6%). An added advantage of this combination is that newer antibiotics can be used therapeutically should wound infection develop.

K. THOMAS ROBBINS, MD
San Diego

REFERENCES

Becker GD: Identification and management of the patient at high risk for wound infection. Head Neck Surg 1986; 8:205-210

Cole RR, Robbins KT, Cohen JI, et al: A predictive model for wound sepsis in oncologic surgery of the head and neck. Otolaryngol Head Neck Surg 1987; 96:165-171

Johnson JT, Schuller DE, Silver F, et al: Antibiotic prophylaxis in high-risk head and neck surgery: One-day vs five-day therapy. Otolaryngol Head Neck Surg 1986; 95:554-557

Johnson JT, Yu VL, Myers EN, et al: Efficacy of two third-generation cephalosporins in prophylaxis for head and neck surgery. Arch Otolaryngol 1984; 110:224-227

Robbins KT, Byers RM, Cole R, et al: Wound prophylaxis with metronidazole in head and neck surgical oncology. Laryngoscope 1987; 98:803-806

Moving Platform Posturography

EVALUATING DIZZINESS and balance disorders can be a complex challenge. The results of traditional neuro-otologic workups, which rely primarily on tests of the vestibulo-ocular reflex, are often negative in these patients. Because the somatosensory, visual, and vestibular systems all contribute to postural control in humans, Romberg test results are also often inconclusive. A new test of postural control, moving platform posturography, has been developed and is proving helpful in diagnosing and treating balance disorders.

Moving platform posturography tests a patient's ability to maintain balance in conditions with and without normal somatosensory and visual information for postural control. In addition to evaluating the patient's ability to use vestibular information to control posture, the test also assesses a patient's motor coordination, strength, quickness, and adaptability in the face of challenges to balance.

Extensive work has been done to establish normative data and patterns seen in diseased states. In one study of 80 patients with known peripheral vestibulopathies, 76 patients (95%) showed normal sway patterns in standard Romberg tests. Of the same group of patients, however, 77 (96%) had significant impairments in postural stability when normal somatosensory and visual cues for postural control were unavailable. Another study used moving platform posturography to study 74 patients aged 65 and older who complained of dizziness or imbalance. Almost all of these patients had signs of peripheral or central vestibulopathies, and 59 (80%) showed increased body sway in test conditions without normal visual and somatosensory cues for postural control.

In addition to providing information for diagnosis, this test can be used to evaluate the functional balance capacity of patients. Test results can be used to devise physical therapy programs or other rehabilitative procedures and to document recovery. For example, sequential tests in patients recovering from vestibular injury can graphically demonstrate the patients' ability or inability to compensate centrally for the injury. This information is valuable to both physicians and patients in assessing progress and directing the decision for further therapy.

In summary, moving platform posturography is rapidly becoming a useful adjunct to conventional neuro-otologic tests in evaluating dizziness and imbalance. In addition to

assessing a patient's ability to use vestibular information to control balance, this test provides a multifaceted assessment of motor responses to challenges to balance. It thus provides an important evaluation of a patient's functional balance capacity that can be used to direct rehabilitative programs.

ROBERTO A. CUEVA, MD
CHARLOTTE L. SHUPERT, PhD
San Diego

REFERENCES

Black FO, Shupert CL, Horak FB, et al: Abnormal postural control associated with peripheral vestibular disorders, *In* Pomeiano O, Allum J (Eds): Progress in Brain Research, Vol 76. Amsterdam, Elsevier, 1988, pp 263-275

Black FO, Wall C III, Nashner LM: Effect of visual and support surface references upon postural control in vestibular deficit subjects. Acta Otolaryngol Scand 1983; 95:199-210

Horak FB, Shupert CL, Mirka A: Components of postural dyscontrol in the elderly: A review. Neurobiol Aging, in press

Nashner LM: Human posture control, *In* Adelman G (Ed): Encyclopedia of Neuroscience. Boston, Burk Hauder, 1987, pp 963-966

Improved Diagnosis of Acoustic Neuroma With Auditory Brain-Stem Evoked Responses and Gadolinium-Enhanced MRI

THE MOST FREQUENT REASON for a clinical suspicion of acoustic neuroma is a unilateral or asymmetric sensorineural hearing loss, although patients may present with persistent vertigo or other neurologic symptoms. As only about 5% of patients undergoing evaluation for an acoustic neuroma will ultimately be found to have a tumor, an efficient and economic diagnostic tree is essential. Following a standard audiometric evaluation, which identifies patients "at risk," auditory brain-stem evoked responses (ABRs) are obtained when there is sufficient residual high-frequency hearing. The ABR is a computer-averaged recording of the changes induced in the electroencephalogram due to sound stimulation. A series of peaks that correspond to different levels in the auditory central nervous system is generated. The results of the ABR are abnormal in more than 95% of patients with proven acoustic tumors. When the latency of the most prominent wave (V) is symmetric and within normal limits, an acoustic neuroma is improbable. The rare false-negative findings generally occur in patients whose acoustic tumors have arisen in the cerebellopontine angle, rather than within the internal auditory canal. False-positive ABR studies are common and indicate the need for an imaging study.

The definitive diagnosis of acoustic neuroma requires an anatomic visualization of the cerebellopontine angle and the internal auditory canal. Contrast-enhanced computed tomographic (CT) scanning reliably visualizes larger tumors but detects less than 50% of tumors that are less than 2 cm in diameter. As the ability to preserve the function of the auditory and facial nerves is highly dependent on tumor size, detecting tumors when they are small is a primary goal in acoustic tumor diagnosis. Recently magnetic resonance imaging (MRI) has become the diagnostic imaging technique of choice in the evaluation of acoustic neuromas, and it has numerous advantages over CT. It provides a noninvasive means of detecting very small tumors that previously would have required gas-contrast CT. False-negative studies appear to be exceedingly rare when a proper slice thickness and imaging technique are used. A few false-positive MRIs have been noted, especially in patients with large internal auditory canals. Within a wide canal that is partially compartmentalized by arachnoid webs, restricted cerebrospinal fluid circulation may lead to an increased protein concentration in the trapped fluid. This returns a bright signal on T2-weighted images. Until recently, adjudicating such equivocal MRI results required gas-contrast CT scans. The introduction of the MRI contrast agent, gadolinium DTPA, however, has rendered this unnecessary. This paramagnetic metal ion, which was recently approved by the Food and Drug Administration, induces a notable increase in the signal intensity of an acoustic neuroma. It has been used in more than 10,000 patients worldwide without significant morbidity. Aside from reducing the incidence of false-positive studies, gadolinium contrast MRI has, in our series, revealed several small tumors that were entirely inapparent on nonenhanced MRI scans. Gadolinium-enhanced MRI also appears to be useful in cases of possible recurrence where differentiating tumor from scar tissue or implanted muscle plug may be difficult using other techniques.

Magnetic resonance imaging also displays surgically important information that was not available on earlier studies. On MRI, the lateral extent of tumor penetration in the internal auditory canal can be evaluated. This both assists the surgeon in planning the operative route (translabyrinthine, retrosigmoid, or middle fossa) and in differentiating an acoustic neuroma from other cerebellopontine angle neoplasms such as meningiomas, which usually do not possess an intracanalicular component. Another advantage of MRI is its ability to visualize intrinsic brain-stem disease such as multiple sclerosis that may mimic the clinical presentation of an acoustic neuroma. In summary, MRI with gadolinium contrast has virtually rendered obsolete all other imaging methods used in diagnosing and characterizing acoustic neuroma. Computed tomography is reserved for those patients known to have metallic implants (MRI hazardous) and in those 5% to 10% of patients who, because of claustrophobia, are unable to tolerate insertion into the magnet.

ROBERT K. JACKLER, MD
MICHAEL J. LANSER, MD
San Francisco

REFERENCES

Barrs DM, Brackmann DE, Olson JE, et al: Changing concepts of acoustic neuroma diagnosis. Arch Otolaryngol 1985; 111:17-21

Cohn AI, Le Liever WC, Hokanson JA, et al: Acoustic neurinoma diagnostic model evaluation using decision support systems. Arch Otolaryngol Head Neck Surg 1986; 112:830-835

House JW, Waluch V, Jackler RK: Magnetic imaging in acoustic neuroma diagnosis. Ann Otol Rhinol Laryngol 1986; 95:16-20

Curati WL, Graif M, Kingsley DPE, et al: Acoustic neuromas: Gd-DTPA enhancement in MR imaging. Radiology 1986; 158:447-451

Implantable Hearing Aids

ONE OF THE NEW AND EXCITING ADVANCES in otolaryngology and head and neck surgery is the development of hearing devices designed to be implanted in the ear of patients with mixed or conductive hearing loss. These devices have some similarities to cochlear implants used for profound hearing loss, but the indications are different.

At this time two basic types exist. In one type a magnet-containing bone screw is inserted into the mastoid bone behind the ear. A modified hearing aid containing a microphone, amplifier, battery, and an output coil is worn externally with the coil lying over the implanted magnet. Sound amplified by the hearing aid goes to the coil, which energizes the magnet to vibrate the skull so that the patient hears by bone conduction. The ear canal is left open, avoiding problems of drainage and recurrent infection with a tight-fitting